CCPR Plans and Initiatives on Energy Metrology

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APEC

Regional Workshop on Measurement Challenges in Renewable Energy and Climate Science

Scope of the CCPR

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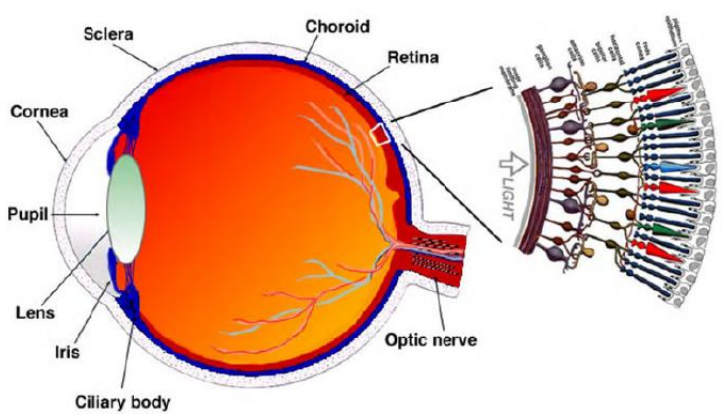
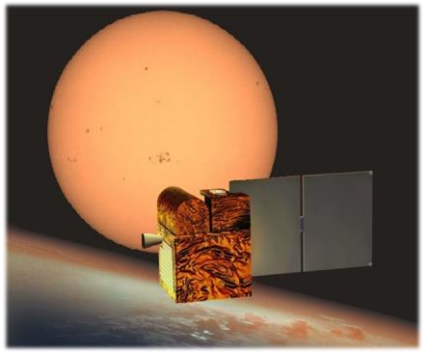
Photometry……

Describes the effects of visible light on the human eye, in terms of brightness (photometry) and colour(colorimetry) perceived by the human eye.



Rdiometry ……

Metrology related to the physical measurement of the properties of electromagnetic radiation, including visible light



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Major events in CCPR

1875

Creation of Metre Convention

1880 Long lasting filament

~ 16 lm/W

1933 CCP

1931 Adaption of luminous function

Commercialization of fluorescent lamp

~ 100 lm/W

1971 CCPR

1979 Adaption of current definition Candela

Commercialization of solid state lamp

250 lm/W~

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Areas of priority and potential

Energy

Photo voltaic

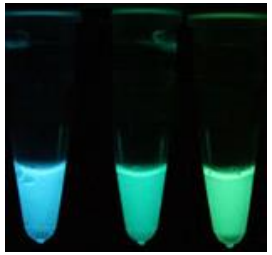
Solid State Lighting (LED, OLED)

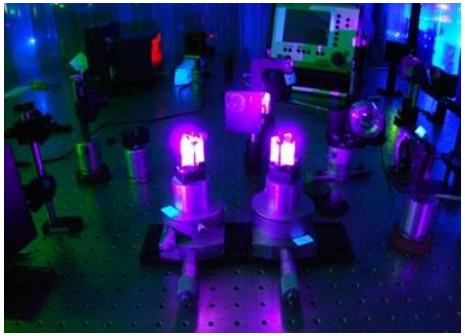
Environment and climate

Optical radiation balance (incoming to outgoing) monitoring in terms of global warming

Health and Quality of life

Use of optical radiation for both diagnosis and treatment





Security

THz industry for communication, spectrometry, imaging

Photon base cryptography

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Economic Impact (Lighting)

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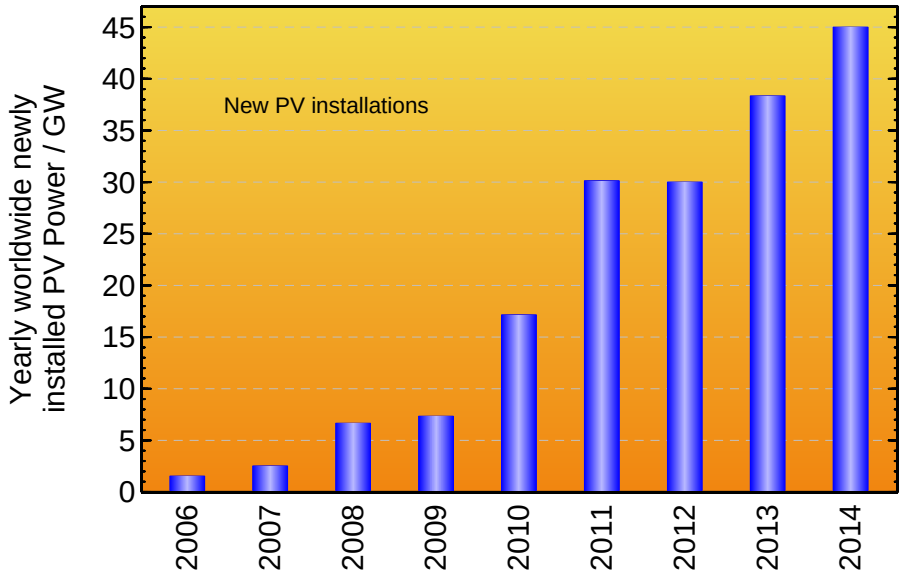
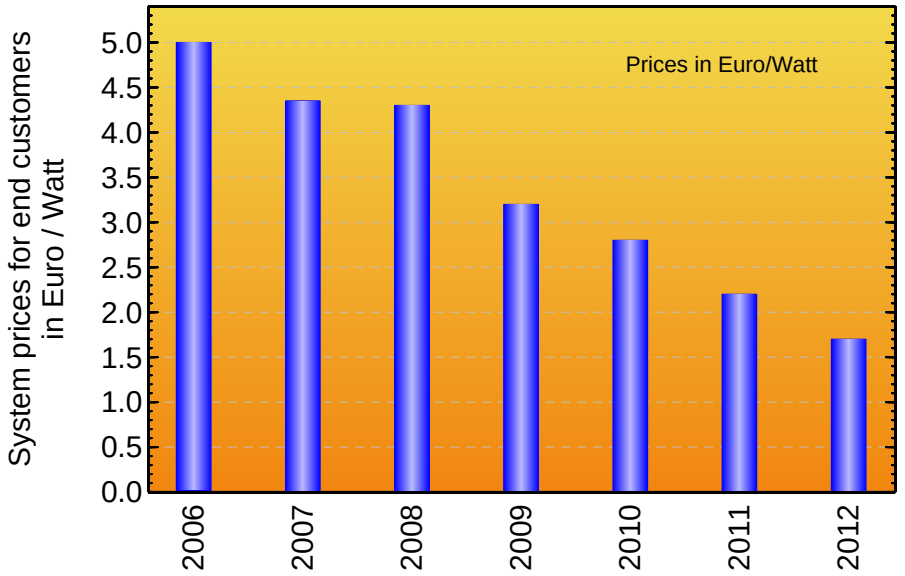
Economic Impact (Photo voltaic)



Source of data: EPIA (European Photovoltaic Industry Association)



Source of data: www.solarwirtschaft.de/preisindex

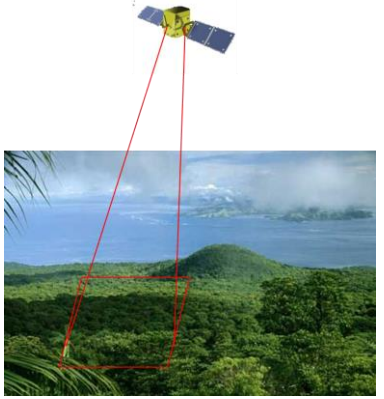
- financial uncertainty = global annual installation × Price × Uncertainty
- for 2012: **financial uncertainty** = 30 GW/year × 1.7 €/W × 1 % = **500 M€/year**

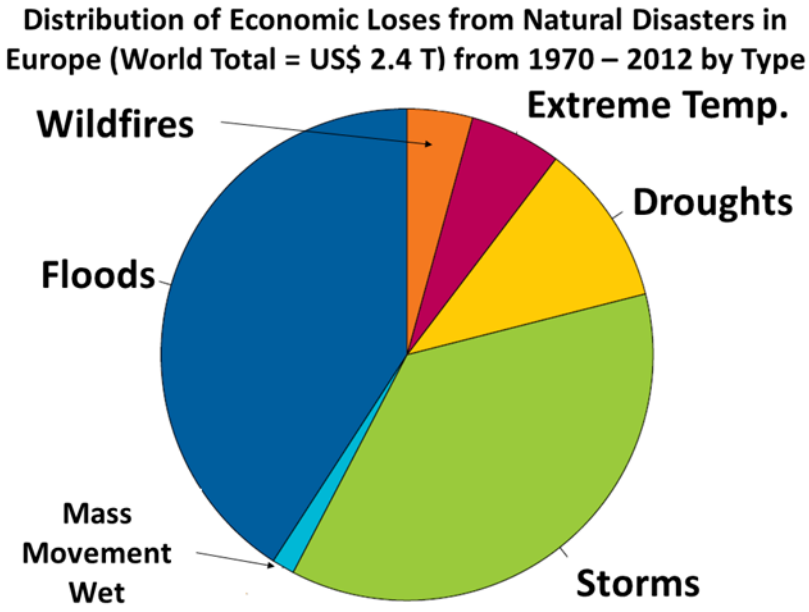
⇒ a measurement uncertainty of 1% leads to a financial uncertainty of 500 M€/year

⇒ high demand for high accuracy solar cell calibrations

Economic Impact (Environmental and climate)

- Global/local Impact depends on Temperature & forecast models.
- Need SI traceable data (over decades) from satellites accurate enough to detect climate sensitive trends from natural variability to constrain/test them
- Following WMO signing MOU new radiometer (CSAR) gave SI traceability & identified 0.3% bias





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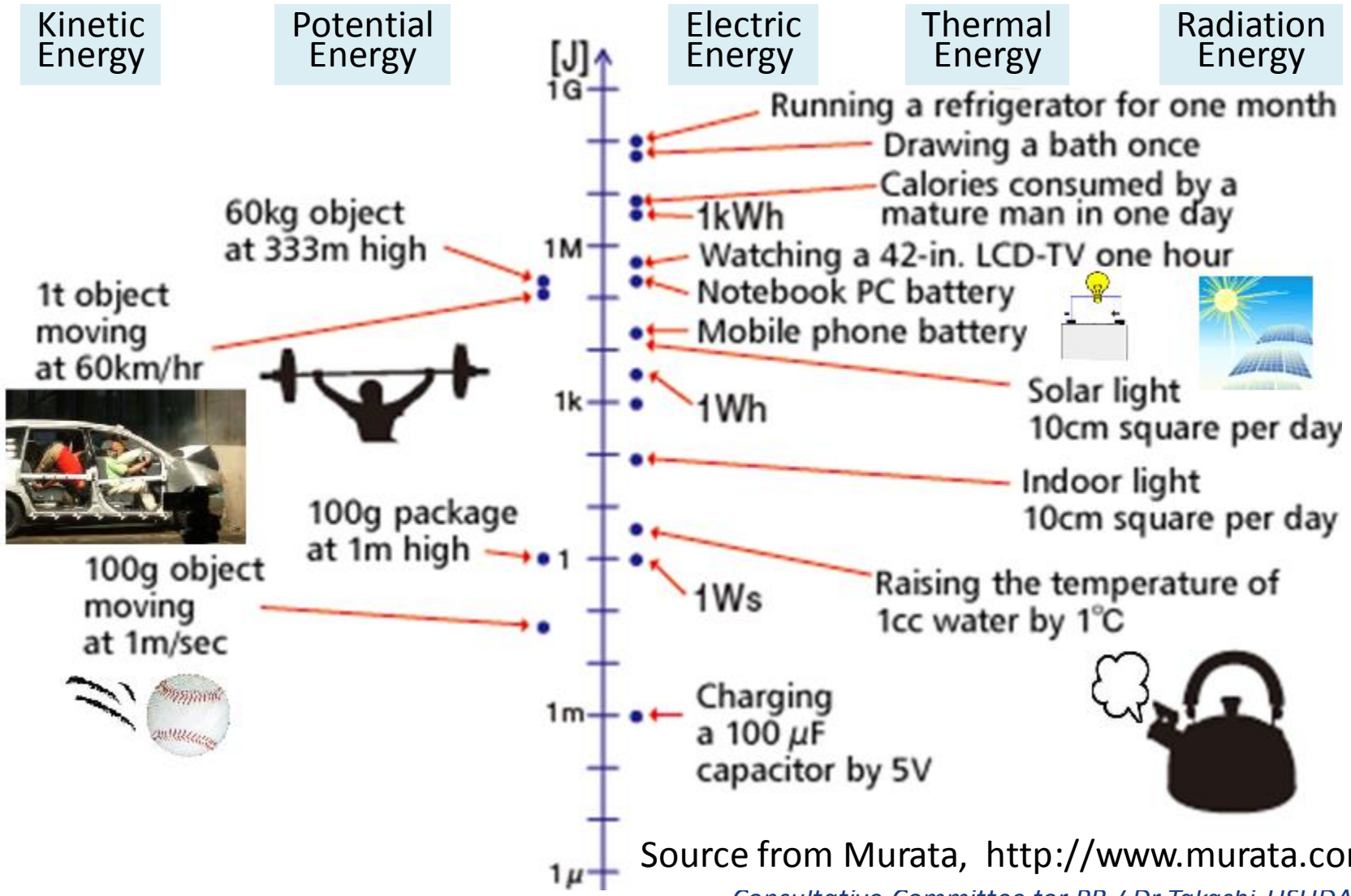
Energy density and magnitude



Source from Murata, http://www.murata.com/

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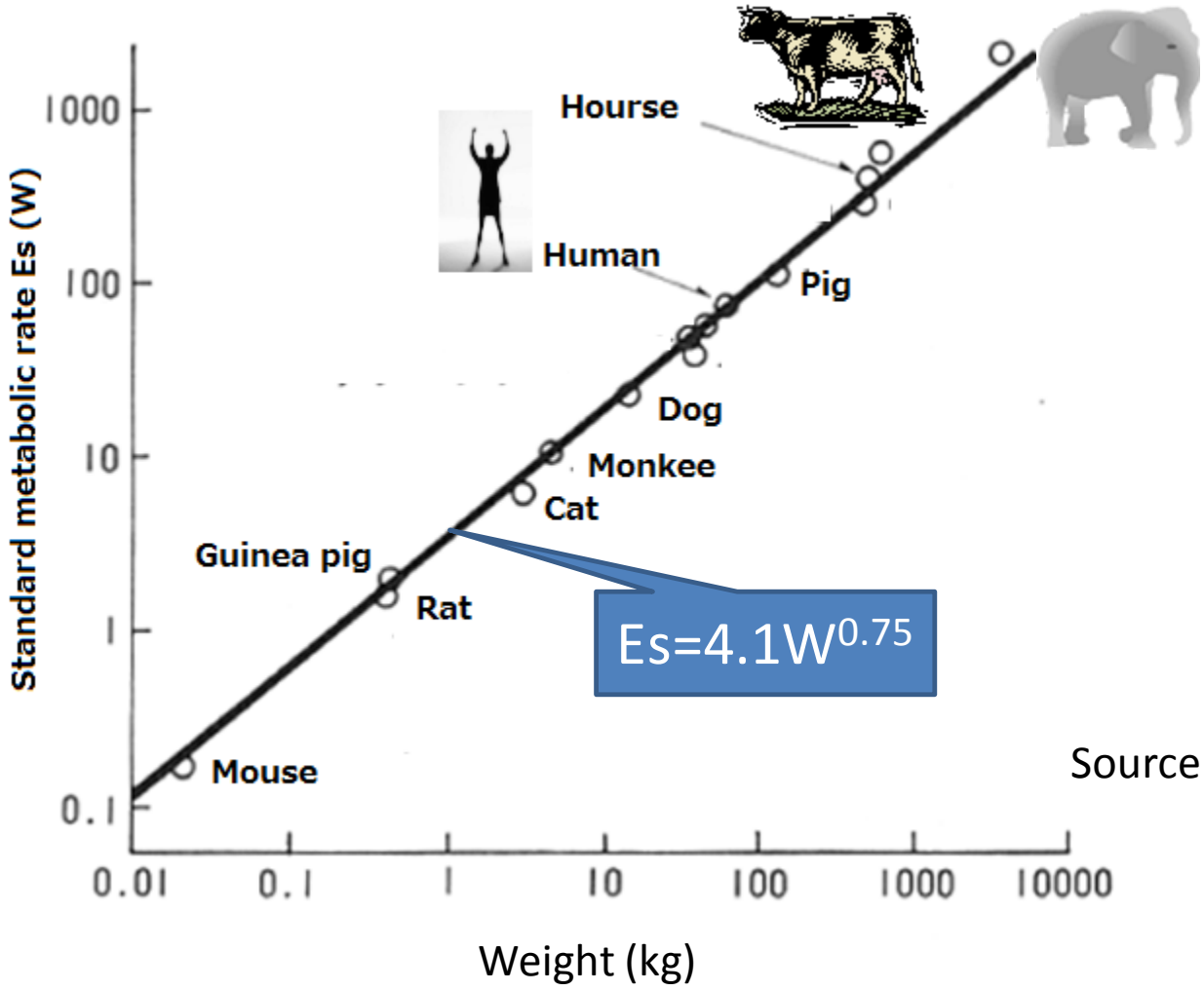
Energy consumption



Source from T. Motoyama

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Summary

- Any energy source is rate-limited by physics. No magic.
- CCPR may not provide any energy source.
- CCPR may provide information for strategic planning of renewable energy installation.
  - Efficiency of light source
  - Efficiency of PV
  - Distribution of solar energy, information for simulation
- CCPR initiate dialogues between/among stakeholders (energy provider, consumer, regulator).
- CCPR may be an assessment tool for evaluation of renewable energy in total.